58TH CONGRESS, 2d Session. } HOUSE OF REPRESENTATIVES. { DOCUMENT No. 514.

WACCAMAW RIVER, NORTH CAROLINA AND SOUTH CAROLINA.

LETTER

FROM

THE SECRETARY OF WAR,

TRANSMITTING,

WITH A LETTER FROM THE CHIEF OF ENGINEERS, REPORTS OF EXAMINATION AND SURVEY OF WACCAMAW RIVER, NORTH CAROLINA AND SOUTH CAROLINA.

FEBRUARY 5, 1904.—Referred to the Committee on Rivers and Harbors and ordered to be printed with accompanying illustrations.

WAR DEPARTMENT,
Washington, February 4, 1904.

SIR: I have the honor to transmit herewith a letter from the Chief of Engineers, United States Army, dated 3d instant, together with copies of reports from Capts. J. C. Sanford and G. P. Howell, Corps of Engineers, dated April 8 and December 8, 1903, on a preliminary examination and survey, respectively, of Waccamaw River, North Carolina and South Carolina, made by them in compliance with the provisions of the river and harbor act of June 13, 1902.

Very respectfully,

WM. H. TAFT,
Secretary of War.

THE SPEAKER OF THE HOUSE OF REPRESENTATIVES.

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, February 3, 1904.

SIR: I have the honor to submit herewith for transmission to Congress reports of April 8, 1903, by Capt. J. C. Sanford, Corps of Engineers, and of December 8, 1903, by Capt. G. P. Howell, Corps of Engineers, on preliminary examination and survey, respectively, of Waccamaw River, North Carolina and South Carolina, authorized by the river and harbor act approved June 13, 1902.

Waccamaw River is at present being improved under a project which provides for a channel 12 feet deep at all stages, with 80 feet bottom width, from the mouth of the river to Conway, S. C., and thence to

Lake Waccamaw a channel cleared of snags and other obstructions. In the opinion of Captain Sanford the river is worthy of improvement to the extent contemplated by the present project, and that a new project should not be entered upon until the present one is completed.

The commerce of the Waccamaw is reported to be about 120,000 tons annually, valued at about $1,600,000.

In his survey report of December 8, 1903, Captain Howell presents plans and estimates for work as follows: For dredging a channel 100 feet wide from the mouth to Conway, with depth at mean low water of 6 feet, $40,000; with depth of 9 feet, $70,000; and with depth of 12 feet (the present project depth), $120,000. Captain Howell recommends that the project for a 12-foot channel be maintained and that this estimate of $120,000 be adopted. The annual cost of snagging on the river above Conway is estimated at $5,000.

An alternative recommendation is submitted by the local officer in favor of a modified plan, which provides for a 12-foot channel to a point near Bucksville, and 6 feet thence to Conway, at an estimated cost of $50,000. For the reasons given in his indorsement of December 11, 1903, the division engineer, Lieut. Col. James B. Quinn, Corps of Engineers, recommends for adoption this last-named plan and estimate.

These papers have been referred for consideration and recommendation by the Board of Engineers for Rivers and Harbors, as provided in sections 3 and 14 of the act of June 13, 1902, and attention is respectfully invited to the Board's report of January 18, 1904, in seventh indorsement thereon. I concur in the conclusions of the Board, as follows:

> Having duly weighed the cost against commercial benefits, the Board is of opinion that it is advisable to continue the improvement of Waccamaw River, South Carolina, with a view to a channel 100 feet wide and 12 feet deep from its mouth to Bucksville, a distance of 36 miles, and a channel of the same width and 6 feet deep from Bucksville to Conway, a distance of 14 miles. The Board is further of opinion that it is advisable to continue snagging operations above Conway, but to a less extent than is indicated by the estimate of the district officer. The following is an estimate of cost of the work deemed advisable by the Board:
>
> | | |
> |---|---|
> | 12-foot channel, 100 feet wide, from mouth to Bucksville | $15,000 |
> | 6-foot channel, 100 feet wide, from Bucksville to Conway | 35,000 |
> | Total | 50,000 |
> | Annual cost of maintenance, including snagging above Conway | 5,000 |

Very respectfully, your obedient servant,

A. MACKENZIE,
Brig. Gen., Chief of Engineers, U. S. Army.

Hon. WM. H. TAFT,
Secretary of War.

PRELIMINARY EXAMINATION OF WACCAMAW RIVER, NORTH CAROLINA AND SOUTH CAROLINA.

UNITED STATES ENGINEER OFFICE,
Charleston, S. C., April 8, 1903.

GENERAL: I have the honor to submit the following report upon a preliminary examination of Waccamaw River, South Carolina, made in accordance with the requirements of the river and harbor act approved June 13, 1902:

The Waccamaw River rises in Waccamaw Lake, North Carolina, flows in a general southwesterly direction through North and South Carolina and empties into Winyah Bay, South Carolina. Its length is about 147 miles, and for the greater portion of its length it flows in a direction nearly parallel to the coast line, and not far from it.

A preliminary examination of this river was made in 1879, under Capt. Charles B. Phillips, Corps of Engineers. (Printed in Annual Report of Chief of Engineers for 1880, pp. 848–851.) Captain Phillips considered the river worthy of improvement and recommended securing a 12-foot channel to Conway, about 50 miles above the mouth, and removing overhanging and fallen trees, snags, etc., and making cut-offs at certain abrupt bends between Conway and Lake Waccamaw at an estimated cost of $29,237. The first appropriation made by Congress for improvement of this river was in 1880, when $15,000 was appropriated. In 1881 $10,000 was appropriated, and in 1882 $4,400. In 1883 a preliminary examination of the portion of the river from Conway (then called Conwayborough) to Lake Waccamaw was made by Capt. James Mercur, Corps of Engineers. (Printed in Annual Report, Chief of Engineers for 1884, pp. 1056–1058.) The following are the conclusions reached by him as to this portion of the river:

> The present commerce is exceedingly small; the prospective commerce, under the most favorable circumstances, not large.
>
> The cost of any permanent improvement would be immense. In my judgment the stream is not worthy of improvement, and the work not a public necessity.

In 1885 the estimated cost of Captain Phillips's above-stated project was revised and placed at $138,400. (See Annual Report, Chief of Engineers for 1885, p. 1105, and for 1886, p. 1022.) There has thus far been appropriated and allotted under this project $111,900, of which $9,000 was allotted from the appropriation of June 13, 1902, and, with the exception of a small amount expended on putting plant into good repair, is still on hand.

In the Annual Report, Chief of Engineers for 1902, page 238, it was stated that to June 30, 1902, about $26,646.69 of the total amount expended on the river had been for maintenance. Deducting this amount from the total appropriated and allotted, and then deducting the remainder from the estimated cost of the project, $138,400, it would appear that to complete the present project would require further appropriation of about $53,146.69. There being considerable doubt, however, as to the present condition of the shoals whose improvement is contemplated in the present project, the approved project for the expenditure of the funds now on hand provides, among other things, for making a survey of the shoals below Conway on which the depth and width are less than required by the project, the purpose of the survey being to determine the amount now needed to complete the project.

I append report of Assistant Engineer Reid Whitford on the preliminary examination made in 1902 of the Waccamaw River from its mouth to Lake Waccamaw. I have personally examined that portion of the river from Conway to the mouth, and believe that the improvement as provided for in the present project is fully justified by the commercial value of the stream. I do not, however, believe that a new project for this river should be entered upon until the present one is practically completed, at which time changed conditions and increased commerce may justify further improvement. The river is, in my opinion, worthy of improvement to the extent contemplated by the

present project. No survey beyond the above-mentioned survey of shoals below Conway, for which present funds are available, is required.

Very respectfully, your obedient servant,

J. C. SANFORD,
Captain of Engineers.

Brig. Gen. G. L. GILLESPIE,
Chief of Engineers, U. S. A.
(Through the Division Engineer.)

[First indorsement.]

ENGINEER OFFICE, U. S. ARMY,
Norfolk, Va., April 16, 1903.

Respectfully submitted to the Chief of Engineers, United States Army.

The recommendations of the district officer are concurred in.

JAMES B. QUINN,
Lieut. Col. Corps of Engineers,
Division Engineer, Southeast Division.

[Second indorsement.]

OFFICE CHIEF OF ENGINEERS, U. S. ARMY,
April 25, 1903.

Respectfully referred to the Board of Engineers for Rivers and Harbors constituted by Special Orders No. 24, Headquarters, Corps of Engineers, series of 1902, for consideration and recommendation.

Additional information has been called for, if available.

By command of Brig. Gen. Gillespie.

A. MACKENZIE,
Colonel, Corps of Engineers.

[Third indorsement.]

BOARD OF ENGINEERS FOR RIVERS AND HARBORS,
Washington, D. C., July 9, 1903.

Respectfully returned to the Chief of Engineers, United States Army.

The Board of Engineers for Rivers and Harbors has considered the within report of the district officer on a preliminary examination of "Waccamaw River, South Carolina," the indorsement of the division engineer thereon, and all other data available. On June 18, 1903, a committee of the Board held a public hearing at Georgetown, S. C., at which interested persons were given opportunity to express their views.

The Waccamaw River is about 147 miles long from its source in Waccamaw Lake, North Carolina, to its mouth in Winyah Bay, South Carolina. There is in existence a project providing for a 12-foot channel from Winyah Bay to Conway, S. C., a distance of about 50 miles, and for clearing the river of snags from Conway to the lake.

The upper third of the section below Conway is obstructed by numerous shoals and has a controlling depth of but 3 feet. Above Conway navigation is restricted to periods of high water.

The commerce of the Waccamaw is reported to be annually about

120,000 tons, valued at about $1,600,000. Of the foregoing about 41,000 tons, valued at about $140,000, may be credited to the river above Conway.

The district officer states that the approved project for the expenditure of funds now available for the improvement of this river provides for a survey of the shoals below Conway.

The Board is of the opinion that the Waccamaw River is worthy of improvement, provided the same can be effected at a reasonable cost, and recommends that the district officer be directed to complete the survey alluded to in the preceding paragraph, and to prepare estimates for channels from Conway to the mouth, 6, 9, and 12 feet deep, respectively, and of suitable width, in order that consideration may be given to such plans of improvement, having due regard to cost and probable resulting benefits. With regard to the snagging operations above Conway the Board recommends that the district officer be directed to prepare an estimate of the probable annual cost of the same.

For the Board.

CHAS. J. ALLEN,
Lieut. Col., Corps of Engineers,
Senior Member of the Board.

[Fourth indorsement.]

OFFICE CHIEF OF ENGINEERS, U. S. ARMY,
July 16, 1903.

Respectfully submitted to the Secretary of War.

This is a report on preliminary examination of Waccamaw River, South Carolina, authorized by the river and harbor act approved June 13, 1902.

Inviting attention to the report of the Board of Engineers for Rivers and Harbors in the preceding indorsement, I recommend that the local officer be directed to make the survey and prepare the estimates of cost recommended by the Board.

A. MACKENZIE,
Acting Chief of Engineers.

[Fifth indorsement.]

WAR DEPARTMENT,
July 18, 1903.

Approved as recommended by the Acting Chief of Engineers.

E. ROOT,
Secretary of War.

[Sixth indorsement.]

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, January 9, 1904.

Respectfully returned to the Board of Engineers for Rivers and Harbors, with report on survey as recommended.

By command of Brig. Gen. Gillespie:

H. F. HODGES,
Major, Corps of Engineers.

[Seventh indorsement.]

BOARD OF ENGINEERS FOR RIVERS AND HARBORS,
Washington, D. C., January 18, 1904.

Respectfully returned to the Chief of Engineers, United States Army.

In third indorsement hereon the Board of Engineers for Rivers and Harbors expressed the opinion that the Waccamaw River is worthy of improvement, provided the same can be effected at a reasonable cost, and recommended a survey, with estimate of cost, for channels from Conway to the mouth, 6, 9, and 12 feet deep, respectively, and an estimate of cost of snagging above Conway.

The accompanying report of the district officer, dated December 8, 1903, contains the information requested by the Board. This report, the indorsement of the division engineer thereon, and the related report of the assistant engineer in local charge of the Waccamaw River, have been examined and reviewed by the Board.

The estimated cost of the several channels to Conway is as follows:

Channel 6 feet deep, 100 feet wide	$40,000
Channel 9 feet deep, 100 feet wide	70,000
Channel 12 feet deep, 100 feet wide	120,000

An estimate is also given for a channel 12 feet deep to Bucksville, 36 miles above the river's mouth, and 6 feet deep from Bucksville to Conway, a distance of 14 miles, the cost being placed at $50,000. The estimated cost of snagging the river above Conway is $5,000 per annum. The annual expense of maintenance of the work recommended below would probably not exceed $2,500.

Having duly weighed the cost against commercial benefits, the Board is of opinion that it is advisable to continue the improvement of Waccamaw River, South Carolina, with a view to a channel 100 feet wide and 12 feet deep from its mouth to Bucksville, a distance of 36 miles, and a channel of the same width and 6 feet deep from Bucksville to Conway, a distance of 14 miles. The Board is further of opinion that it is advisable to continue snagging operations above Conway, but to a less extent than is indicated by the estimate of the district officer. The following is an estimate of cost of the work deemed advisable by the Board:

12-foot channel, 100 feet wide, from mouth to Bucksville	$15,000
6-foot channel, 100 feet wide, from Bucksville to Conway	35,000
Total	50,000
Annual cost of maintenance, including snagging above Conway	5,000

For the Board.

A. M. MILLER,
Lieut. Col., Corps of Engineers,
Senior Member of the Board.

REPORT OF MR. REID WHITFORD, ASSISTANT ENGINEER.

UNITED STATES ENGINEER OFFICE,
Georgetown, S. C., August 15, 1902.

CAPTAIN: In compliance with instructions contained in your letter of July 31, 1902, I have the honor to make the following report upon the preliminary examination of Waccamaw River, North Carolina and South Carolina.

The examination was made with the view of investigating the commercial importance of the river in these two States, present and prospective, in order that a deci-

sion might be formed, based on these data, as to whether the river was worthy of a detailed survey, and looking to the formation of a new estimate for its future and more thorough improvement.

GENERAL FEATURES.

The river "has its source in Waccamaw Lake, North Carolina, and, after flowing in a southwesterly direction approximately parallel to and not far from the seacoast, empties its water into Winyaw Bay, at Georgetown, S. C. The lake is a body of fresh water about 3 miles wide and 5 miles long, with probable average depth of 8 feet, situated on the line of the Wilmington, Columbia and Augusta Railroad, about 25 miles from Wilmington, N. C. The total length of the river is possibly 147 miles, and the distance from head to mouth by a straight line would probably be 70 miles. During low stage of the river the influence of the lunar tides is felt probably as far up as 97 miles above Georgetown, which goes to prove that even the total fall of the river must of necessity be very little. At the flush-water periods, however, there is a constant fluvial current for the most part, though there may be a slight swell of the flood for some distance up the river.

"There is very little current on the lower Waccamaw, but a greater velocity on the upper portion of the river is found. This stream flows through a cypress and juniper timbered land, which imparts to its waters a dark hue, but the water is said to be very pure and healthy.

"The soil along the river is well adapted to the production of cotton, corn, potatoes, rice, and various fruits. The lands generally are well and richly timbered. It is thought that there is no river in this State better suited to free, safe, and easy navigation than this. The Waccamaw may at some future day form a link in the chain of the proposed 'inland water route' along the Atlantic coast. Capt. Charles B. Phillips refers to the possibility of this in a report of his to the Chief of Engineers in 1880 concerning this river, and adds that this same thing was mentioned over forty years previous to that time by Lieut. Col. James Kearney, Topographical Engineers."

HISTORY OF EXAMINATIONS.

The first of these, of which there is any record known to this office, was authorized in the year 1805 by an act of the South Carolina legislature, appointing a board of commissioners, whose duty it was to ascertain, by examination, the cost of the improvement of the river from the mouth of Bull Creek to the North Carolina State line. No report could be found giving the result of this examination.

The next examination, of which this office has any record, was made by act of March, 1879, or after a lapse of seventy-two years, by Capt. Charles B. Phillips, Corps of Engineers, U. S. Army (see Annual Report of the Chief of Engineers for 1880, p. 848, where details are given). As a result of the examination Captain Phillips recommended an expenditure of $29,370, and speaks of the amount as being "certainly moderate, considering the length of the river and the great advantages to commerce which would attend the improvement."

The plan of the improvement as embodied within the project, formed from information collected in this examination, provided for a channel 12 feet deep from Winyah Bay to Conwayborough, now called Conway, and above that place a channel simply cleared of obstructions, the former to be secured by dredging, the latter by snagging. The engineer officer speaks of the hurried manner in which the examination had to be made, because of the limited time and money he had at his disposal for this purpose, and implies that his assistant engineer's report was not as thorough as it would have been under more favorable circumstances.

In the year 1883 the river was examined by Capt. James Mercur, Corps of Engineers, U. S. Army, in person between Lake Waccamaw and Conway (for details, see Report of the Chief of Engineers for 1884, beginning on p. 1056). This officer speaks of "there being absolutely no through traffic upon this river" at that time, but gives an approximate list of shipments between Star Bluff and Conway. He made no alterations in Captain Phillips's estimate for the improvement of the stream.

Capt. W. H. Bixby, Corps of Engineers, U. S. Army, examined the entire length of the river from Lake Waccamaw to Georgetown in the year 1886, revising and increasing the original estimate, and recommending that $138,400 be expended in the future improvement of the stream, and stated that the yearly commerce actually carried over its channels was worth $1,300,000 (for details, attention is invited to Annual Report of Chief of Engineers for 1886, beginning on p. 1022). This amount probably included a portion at least of the Great Pedee River freights, which pass over a part of the Waccamaw, to get them to Georgetown.

By direction of the engineer officer then in charge of the district, the undersigned

made a rapid, inexpensive survey of the river from Lake Waccamaw to Georgetown, in the year 1887, for the purpose only of completing a map of the shore lines of the stream, so as to form some idea of distances more correctly than by guessing at them, which had been the previous practice, for reproduction of same (see Annual Report of the Chief of Engineers, p. 1200).

While of course the map never was considered as being thoroughly accurate, still it was better than none at all, and filled the requirements at that time. There was no attempt made at forming new estimates or correcting old ones by this survey; neither was anything of a commercial nature investigated.

* * * * * * *

In the year 1884, by direction of Capt. W. H. Bixby, Corps of Engineers, U. S. Army, the undersigned completed surveys of quite a detailed nature of all shoals between Conway and the mouth of the river at that time interfering with the navigation of the channels. Estimates were made from those for increasing the depth of the river, but it has been many years since then and so many changes have probably occurred in the bed of the stream that it would probably not be practicable now to use the figures made then.

The next examination is the one ordered in your letter of July 31, 1902, of which this report specifically treats, and after giving a brief history of the improvement of the river, this report will follow for your consideration.

HISTORY OF WORKS OF IMPROVEMENT.

The oldest account which could be found relating to the improvement of the Waccamaw River was in the year 1778, being an act of the South Carolina legislature providing for the improvement of the river from the North Carolina line to Holders Bluff, the work to be done by the male inhabitants of the country along the river, each of whom was to serve in this way twelve days in the year.

The next attempt was made in the year 1783, by an act of the legislature providing for improvements between points and in the same manner as mentioned above.

No record could be found of any attempt to improve the river from 1783 to the year 1880, when the United States Government appropriated $15,000 for the work. Since then operations have been carried on at intervals, as appropriations became available, much benefit being done to the growing commerce, but very much was necessarily left undone because of the meagerness of the appropriations and periods of time between their availability.

SPECIAL EXAMINATION OF THE RIVER JUST COMPLETED.

The most important commercial section of the river was passed over on a steam launch, and all the principal shipping points were visited for the purpose of collecting commercial statistics by direct examination of the freight record books.

The river was found to be in good, serviceable condition from Georgetown to the mouth of Bull Creek, 22½ miles; farther up, to Bucksville, 12½ miles, there are several shoal places and many log obstructions, but the depth is probably not more than 10 feet at mean low water. A short distance below Bucksville (3 miles) there is a sharp bend known as "Big Needle Eye," which is obstructive to navigation and should be cut off in the general improvement of the river. Beyond Bucksville to Conway, 15 miles, a growing, thrifty town of about 1,500 inhabitants, and having excellent railroad connections, being the principal shipping point on the river, numerous shoals are found as well as many obstructions, such as logs, snags, and overhanging trees, and the river grows narrower and more tortuous than below, with a controlling depth of probably 3 feet at mean low water, the worst place being known as Coxs shoal, where steamers are delayed at every low water.

A number of cut-offs might be made with advantage and economy along this section of the river, as well as above Conway, which would straighten the channel and obviate the necessity of dredging some of the shoals.

Above Conway the river is more obstructed than below, and is shallower, the controlling depth being not more than 1 foot at mean low water, and is badly obstructed by logs and fallen timber.

Past operations on this stream have been confined exclusively to snagging and clearing banks, except that in the very beginning of the improvement, twenty years ago, an attempt was made to deepen some of the shoals below Conway by a system of pile and brush jetties; but as it was discovered after making this experiment that they would probably not accomplish the object in view, their further construction was abandoned, and it was determined to have recourse to dredging in making future

efforts to deepen Waccamaw River. The appropriations made from time to time, however, being even inadequate to maintain a snagged channel, no dredging could be done. The appropriations under the estimate for the completion of the project were gradually used up in the struggle of the Engineer Department to provide and maintain simply a snagged channel, so that the boats might be allowed to run during the flush-water period.

COMMERCE.

The commerce is at present carried on above Conway, when the water is high enough to permit their running, by two side-wheel steamers of 283 and 89 tons, respectively, and a steam launch of 4 tons, towing a deck lighter. In addition to these there are pole flats and rafts. The larger of the side-wheel boats operates as high up as Red Bluff, 74 miles from the mouth, and the others go a great deal farther than that, depending upon the stage of the water, reaching at times to at least Reaves Ferry, North Carolina, 117 miles above the mouth.

Rafting of timber is done at times all the way from that point to Lake Waccamaw, so it is said. Below Conway the commerce is carried on by these same steamers, together with those and other craft shown on accompanying list.

The following commercial figures were obtained in the most reliable manner possible, freight shipping books having been examined in person, shipping agents and traffic managers questioned, and every effort made to get same correctly, for fiscal year ending June 30, 1902, and are not believed to be overestimated. They represent the freights that are actually carried over and belong strictly to the Waccamaw River, in its commercial development. The discrepancy which appears between these figures and those shown in the annual reports for the Waccamaw is caused by Captain Dusenbury, who furnished these annual statements, including in the Waccamaw the Great Pedee River freights, which have to be carried over, in part, the lower portion of the Waccamaw River to get them to Georgetown.

The separation is made in this report so as to cause the Waccamaw River commerce to stand distinctly and definitely on its own merits. People generally are under the impression that the Waccamaw River ought to be given credit for the Great Pedee freights passing over it, because to get them to Georgetown via the Great Pedee River proper would require a very large amount to be expended to improve that river to its mouth near Georgetown.

Commercial statement.

	Tons.	Value.
Outward freights	112,581	$1,060,837
Inward freights	6,750	576,310
Total	119,331	1,637,147
30,134 steamboat passengers, fares		5,766
		1,642,913

Of the foregoing, 40,343 tons of outward freights, valued at $99,946, and 396 tons inward freights, valued at 39,520, can be said to belong properly to the river above Conway, and the balance should be assigned to the river below that town.

PROSPECTIVE COMMERCE.

In regard to the prospective commerce, should the river be improved so as to permit the traffic to continue uninterruptedly throughout the year between certain points, it is exceedingly difficult to make any positive forecast as to what the probable amount of that would be. As the trade and commerce have steadily become more permanently fixed on the river since the beginning of governmental improvements, no reason is known why it should not now increase at a reasonable rate should the river be improved in depth to permit navigation as stated. The people living along this river seem to be prospering, towns are improving, new lands are being cleared, and the country being more thickly settled.

Those who are best acquainted with the commercial possibilities of the Waccamaw country estimate that, should the Government decide to carry out the improvements as mentioned above, the commerce would soon increase at least 50 per cent as a

result of the work, and no reason is known to the undersigned why it should not do so. A very considerable portion of this increase will be on the river above Conway.

Transportation facilities furnished by the river, which the people could rely upon, would probably cause new industries to spring up and in every way encourage the development of the resources of the fertile lands and different kinds of timber within reach of the river and on each side of it.

The depths of channel probably required to comply with the existing commercial demands are 12 feet at mean low water from Georgetown to Conway, with not less than 80 feet width; 6 feet same stage of water from Conway to Red Bluff, width 50 to 60 feet; Red Bluff to Wortham's bridge, same stage of water, depth 3 feet, width 40 feet. At present, from Wortham's bridge to Lake Waccamaw, a channel to be cleared only of logs, snags, and overhanging trees.

The estimate of the probable cost of completing this improvement which follows is approximate only and is not intended for use to base any calculation on in the formation of projects, but only to furnish some idea as to the probable cost to the United States for completing this improvement, so that comparisons might be made between the money value of this and that of the commerce, present and prospective, in order that a definite conclusion might be reached as to whether or not the river is at this time worthy of a detailed survey, the object of the survey being to secure information from which to form a reliable estimate of the cost of the improvement as stated.

Estimate.

Below Conway, providing for a depth of 12 feet at mean low water:	
274,815 cubic yards dredging shoals, at 15 cents per cubic yard	$41,222.25
166,666 cubic yards cut-offs to be dredged, at 20 cents per cubic yard	33,333.20
Twelve months' work of snag boat, at $500 per month	6,000.00
	80,555.45
Above Conway, to Red Bluff, 6 feet at mean low water:	
31,111 cubic yards dredging shoals, at 15 cents per cubic yard	4,666.65
18,518 cubic yards cut-offs, at 20 cents per cubic yard	3,703.60
Ten months' work of snag boat, at $500 per month	5,000.00
	13,370.25
Red Bluff to Wortham's bridge:	
35,200 cubic yards dredging shoals, at 15 cents per cubic yard	5,280.00
20,000 cubic yards cut-offs, at 20 cents per cubic yard	4,000.00
Eighteen months' work of snag boat, at $500 per month	9,000.00
	18,280.00
Wortham's bridge to Lake Waccamaw:	
Twenty-four months' work of snag boat, at $500 per month	12,000.00
Add 10 per cent for superintendence and contingencies	12,420.50
Total	136,626.27

After this expenditure it will probably require $6,000 to $8,000 a year in maintenance.

Taking all the foregoing into consideration, the Waccamaw River is deemed at present worthy of improvement to this extent.

It is therefore recommended that the river be surveyed from Lake Waccamaw to the mouth of Bull Creek, and that the following general plan for this work be adopted:

Lake Waccamaw to Seven Creeks: No instrumental work be attempted, but that some reliable person be sent over the river to get as accurate account as possible of such obstructions as logs, snags, overhanging trees, etc. The map of the Waccamaw River now in the files of the Engineer Department (see p. 1200, Annual Report of the Chief of Engineers for 1889) will answer the purpose for this portion of the river, as no absolutely correct map of a river where snagging only is done is required. Under the present existing circumstances the time is so limited that to attempt to accurately survey and map the whole river might result in none of it being finished as thoroughly as it should be for basing estimates for dredging, etc.

It is therefore recommended that as careful instrumental work be finished as time will allow between "Seven Creeks" and mouth of Bull Creek, the preference of this work being given to that portion between Wortham's bridge and Bull Creek, the

soundings on the map to represent mean low water. It is not recommended that any surveying from Bull Creek to the mouth of the river at this time be undertaken.

It is estimated that about $1,500 will be required to survey, sound, and map the river in sufficiently accurate manner for the purpose of making reliable estimates for the river's improvement.

The development of the survey may show that to extend the dredging to Seven Creeks (about 13 miles above Wortham's bridge and 2 miles above Pireway Ferry) would increase the estimate very little. If that proves to be the case, it is respectfully recommended that this extension be made for the upper limit of the dredging, as Pireway Ferry is considered an important shipping point.

Very respectfully, your obedient servant,

REID WHITFORD,
Assistant Engineer.

Capt. J. C. SANFORD,
Corps of Engineers, U. S. A.

SURVEY OF WACCAMAW RIVER, NORTH CAROLINA AND SOUTH CAROLINA.

UNITED STATES ENGINEER OFFICE,
Charleston, S. C., December 8, 1903.

GENERAL: In compliance with instructions contained in letter from Office Chief of Engineers, United States Army, July 22, 1903, I have the honor to submit the following report upon a survey of the Waccamaw River, South Carolina, below Conway, with estimates of cost for channels 6, 9, and 12 feet deep, respectively. The survey was made in November, 1903, under the supervision of Asst. Engineer Reid Whitford, at Georgetown, S. C., who also prepared the estimates. His report is appended.

The survey covers the river between the mouth of Bull Creek, 23 miles above the mouth in Winyah Bay, and Conway, a distance of 26½ miles. Below Bull Creek the channel depth is 12 feet and over, requiring no survey. The Great Pedee River is only a short distance to the westward, and the two streams are connected by several creeks, Bull Creek being the first and the largest. The commerce of the Great Pedee is carried through Bull Creek to the Waccamaw River and thence to Winyah Bay.

Above Bull Creek the character of the river changes. It has less width and numerous sharp bends. The water is black and carries no silt. The banks are covered with trees—cypress, gum, and the like—and there is no erosion. Tidal influence extends 30 miles above Conway, the daily rise and fall at Conway being from 2 to 3 feet. In times of freshet the maximum height at Conway is about 8 feet above low water. Owing to this gentle slope, dredging and making cut-offs will have no deleterious effects on the river, and the improvement will last for years.

The principal cut-offs are at Needles Eye (mile 9, sheet 2), Thoroughfare Creek (mile 17, sheet 4), and Burroughs (mile 25, sheet 5). The cut-off shown on sheet 5, between miles 23 and 24, will not be made. For reasons stated in Mr. Whitford's report, the line marked "X-X" is selected at Thoroughfare Creek. A cut-off at this place involves, for a 12-foot channel, only 16,000 cubic yards more dredging than in the river proper. The other places where cut-offs are recommended are at points in the river where navigation is difficult on account of the

sharp bends, especially to the side-wheel steamers, 125 feet long, that ply on the river.

Allowing for the dredging in the river proper that will be avoided by making the cut-offs, the estimates for a channel 100 feet wide are as follows:

Six-foot depth:	
Dredging in river proper, 14,588 cubic yards, at 12 cents	$1,750.56
Cut-offs, 197,866 cubic yards, at 18 cents	35,615.88
Contingencies, about 10 per cent	2,633.56
Total	40,000.00
Nine-foot channel:	
Dredging in river proper, 124,855 cubic yards, at 12 cents	14,982.60
Cut-offs, 265,426 cubic yards, at 18 cents	47,776.68
Contingencies, about 10 per cent	7,240.72
Total	70,000.00
Twelve-foot channel:	
Dredging in river proper, 397,624 cubic yards, at 12 cents	47,714.88
Cut-offs, 333,703 cubic yards, at 18 cents	60,066.54
Contingencies, about 10 per cent	12,218.58
Total	120,000.00

A 12-foot channel will enable seagoing vessels and barges to load up the river and go to sea without breaking bulk at Georgetown. The original project, made in 1880, provided for a 12-foot channel to Conway, and since then sawmills have sprung up along the bank, sending to market yellow-pine lumber, cypress shingles, etc. Schooners drawing from 8 to 12 feet already ply on the lower stretches of the river, and there is reason to believe that, with sufficient water, they would go to the mills higher up. The 6-foot channel would enable the side-wheel steamers that now run on the river to have good water at all times, especially in the low-water period when cotton is moving.

There is not much necessity for a 9-foot channel, as the river steamers do not require it and it is not enough for seagoing vessels.

It is recommended that the original project for a 12-foot channel to Conway be maintained and that the cost be placed at $120,000.

Attention is invited to the fact that up to mile 13 and a little beyond Bucksville very little dredging is required for a 12-foot channel. Bucksville is the last settlement of any size along the river until Conway is reached. The cost of a 12-foot channel to Bucksville and a 6-foot channel beyond to Conway will be as follows:

Twelve-foot channel from Bull Creek to mile 13	$15,000
Six-foot channel from mile 13 to Conway	35,000
Total	50,000

This modified plan is recommended if the 12-foot channel all the way to Conway is not adopted.

It is estimated that the annual cost of snagging on the river above Conway will be $5,000.

G. P. HOWELL,
Captain, Corps of Engineers.

Brig. Gen. G. L. GILLESPIE,
Chief of Engineers, U. S. A.
(Through the Division Engineer.)

[First indorsement.]

OFFICE OF THE DIVISION ENGINEER, SOUTHEAST DIVISION,
Savannah Ga., December 11, 1903.

Respectfully submitted to the Chief of Engineers.

In view of the very great cost of a 12-foot channel to Conway, it is not believed that the conditions fully justify such an improvement.

A 9-foot channel is not deemed of sufficient value to warrant its construction, as it is too shallow for seagoing vessels and unnecessarily deep for river steamers.

Above the 13-mile point the river changes its character materially, and it is believed that a 12-foot channel up to this point and a 6-foot channel from this point to Conway would be all that would be justified by present commercial conditions. Such improvement can be effected for $50,000, and is recommended, as it is considered to be worthy.

JAMES B. QUINN,
Lieut. Col., Corps of Engineers,
Division Engineer, Southeast Division.

REPORT OF MR. REID WHITFORD, ASSISTANT ENGINEER.

UNITED STATES ENGINEER OFFICE,
Georgetown, S. C., December 4, 1903.

CAPTAIN: To comply with directions contained in your letter of July 25, 1903, I have the honor to make the following report of the survey of the Waccamaw River, with a view of forming estimates for channels from Conway to the mouth 6, 9, and 12 feet deep at mean low water, channel width adopted being 100 feet.

The survey was confined between the mouth of Bull Creek and Conway, the former place being 23 miles from the mouth of the Waccamaw River, at Georgetown, and the latter place 26½ miles above the creek.

The survey was made with a Heller & Brightly transit, using compass bearings and stadia measurements. The mean low-water level was determined by averaging all of the low-water readings on the standard gauge at Conway, S. C., for the past eleven years, beginning with 1893. The soundings were all reduced to this place of reference and were taken on lines as shown on accompanying tracing (in 5 sheets). Scale, 1 inch=500 feet.

The map could not well have been made on a smaller scale to show sufficient detail.

It will be observed that the river becomes quite crooked above Bull Creek, its tortuosity increasing as Conway is approached. As a matter of fact, the river is difficult of navigation up that way by the steamers at present engaged in carrying on the traffic of the stream by the numerous short bends occurring in quick succession to each other. The depth is fairly good up to mile 14, miles being numbered from mouth of Bull Creek.

Above mile 14 the river shoals considerably, the shallowest place being at what is known as Coxs shoal, where the depth is only 3½ feet at mean low water.

As full information concerning this stream, both as to its physical features, history of its past surveys and improvements, and importance of its yearly commerce, were given in full in the preliminary examination report dated August 15, 1902, and already forwarded to your office, nothing of interest relating to these subjects can be added to this report. Aside from that, other important data relating to the commercial value of the Waccamaw River was presented to the Board of Engineers which convened in this office June 18, 1903.

Therefore this report will mainly deal with estimates for dredging in the proposed improvement of the stream and such recommendations as may be thought advisable to form a project for deepening the Waccamaw River to Conway, which seems to be urgently needed, in order that the commerce may be expanded in that growing and prosperous country.

It is believed that a number of cut-offs can be made to marked advantage in the proposed improvement, and especially is this the case as shown on sheet 4, at Thoroughfare Island, via Thoroughfare Creek. Other cut-offs and "point dredging" are also indicated by full lines at intervals, which can be observed by looking over each sheet of the map.

Estimate for 6-foot depth at mean low water, confining the proposed lines of dredging strictly to the river proper and avoiding all cut-offs, width 100 feet:	
16,748 cubic yards material, at 12 cents	$2,009.76
Add 10 per cent for superintendence and contingencies	200.98
	2,210.74
Estimate for 9-foot depth at mean low water, confining the proposed lines of dredging strictly to the river proper and avoiding all cut-offs, 100 feet width:	
152,289 cubic yards material, at 12 cents	18,274.68
Add 10 per cent for superintendence and contingencies	1,827.47
	20,102.15
Estimate for 12-foot depth at mean low water, confining the proposed lines of dredging strictly to the river proper, and avoiding all cut-offs, 100-foot width:	
550,480 cubic yards material, at 12 cents	66,057.60
Add 10 per cent for superintendence and contingencies	6,605.76
	72,663.36

Estimates for 6, 9, and 12 foot depths, via river and cut-offs:	Cubic yards.
Sheet 2 of map, station 147—	
6-foot depth	9,900
9-foot depth	12,600
12-foot depth	15,300
Sheet 3 of map, stations 137 and 138—	
6-foot depth	9,370
9-foot depth	11,926
12-foot depth	14,481
Sheet 2 of map, points at stations 174 and 177—	
6-foot depth	16,083
9-foot depth	20,481
12-foot depth	24,870
Sheet 4 of map, points at stations 86, 84, 83, X-X Thoroughfare cut—	
6-foot depth	115,295
9-foot depth	154,516
12-foot depth	193,739
Sheet 5 of map, points at stations 38, 32, 31, 30, 25, 15, 12—	
6-foot depth	69,218
9-foot depth	103,236
12-foot depth	136,313

Total for river channels and cut-offs:	
6-foot depth—	
219,866 cubic yards, at 18 cents	$39,575.88
16,748 cubic yards, at 12 cents	2,009.76
	41,585.64
10 per cent for superintendence and contingencies	4,158.56
	45,744.20

Total for river channels and cut-offs—Continued.	
9-foot depth—	
302,759 cubic yards, at 18 cents	$54,496.62
152,289 cubic yards, at 12 cents	18,274.68
	72,771.30
10 per cent for superintendence and contingencies	7,277.13
	80,048.43
12-foot depth:	
384,703 cubic yards, at 18 cents	69,246.54
550,480 cubic yards, at 12 cents	66,057.60
	135,304.14
Add 10 per cent for superintendence and contingencies	13,530.41
	148,834.55
Estimate, same as above, with the exception only of following the river to the right of Thoroughfare Creek and excavating only such cut-offs as shown, at stations 66, 70, 75, and 78, and Jacksons Bluff:	
6-foot depth—	
220,273 cubic yards, at 18 cents	39,649.14
16,748 cubic yards, at 12 cents	2,009.76
	41,658.90
Add 10 per cent for superintendence and contingencies	4,165.89
	45,824.79
9-foot depth—	
295,500 cubic yards, at 18 cents	53,190.00
152,289 cubic yards, at 12 cents	18,274.68
	71,464.68
10 per cent for superintendence and contingencies	7,146.47
	78,611.15
12-foot depth—	
369,777 cubic yards, at 18 cents	66,559.86
550,480 cubic yards, at 12 cents	66,057.60
	132,617.46
10 per cent for superintendence and contingencies	13,261.75
	145,879.21

The saving in distance by the cut-off X-X at Thoroughfare Creek is 2½ miles, avoiding the most crooked portion of the river and that most difficult of navigation.

The excess of cost by the Thoroughfare Creek route over the other by 9-foot depth is about $1,800, and for the 12-foot depth is about $3,600, and for the 6-foot depth is practically the same.

The cut-off Y-Y at Thoroughfare Creek is not considered because of its excessive cost.

The object of improving the Waccamaw River to Conway for any depth over 6 feet is to permit seagoing vessels and barges to be towed up as high as that place and load them with lumber, shingles, and other heavy freights direct for an ocean voyage, via Winyah Bay, without breaking bulk.

It would be exceedingly difficult, if not next to impossible, to tow around the crooked bends in the river to the right or east of Thoroughfare Creek without making the cut-offs as indicated on the map.

Conway is a growing town and a center of a very large lumbering country, and with 12-foot navigation at mean low water from its wharves to the ocean will probably in a short time develop into a large shipping port for such commodities as lumber, shingles, and the like, which would not bear being brought down on lighter

craft and rehandling in loading to deeper seagoing vessels at Georgetown because of the extra expense thus incurred.

To provide a 6-foot navigation the river would be of somewhat more general use than it is at present. A 9-foot depth would be still more so, but neither would be sufficient to accommodate the draft of seagoing craft. Twelve feet might be sufficient to accomplish that, but it would not be any too much.

The original project, made in 1880, for improving the river provided for a 12-foot depth to Conway, and was made by Capt. Charles B. Phillips, Corps of Engineers, U. S. A., which shows as far back as then that the river was considered worthy of improvement to that depth, and if then it was of sufficient commercial importance to require that depth it is now a great deal more worthy of such improvement, taking into consideration the general advance and progressiveness of the country, increase in population, and the demands for better transportation facilities and cheaper rates.

For reasons given it is therefore recommended that the original project of 12-foot depth to Conway be adhered to, and the route adopted be via the cut-offs shown on the map, including that one at X-X, on Thoroughfare Creek, at a total approximate cost of $148,834.55.

The land through which the cut-offs are to be made is flat swamp, about 5 feet above low water, covered with original growth of cypress, gum, and the like, all of which can be dredged by modern machinery without blasting, and the excavations deposited on either side of the cut. The excavated material from the river can be disposed of in some instances by dumping on the adjacent banks and in others by towing off in dump lighters and deposited in near-by lakes and arms of the river.

There are often months in each year when the water level is controlled by lunar tides as far as 30 miles above Conway, the daily rise and fall at Conway being from 2 to 3 feet, owing to prevailing winds on the lower river. The mean range in tide at Georgetown, about 49 miles below Conway, is about 4 feet.

The fall of the Waccamaw is very little, the current sluggish even when the river is in freshet, and when this is the case the maximum height at Conway is probably 8 feet above low water. Because of the gentle slope of the stream it is believed that the cut-offs can be made with satisfactory results and without danger of increasing the velocity of the current to such an extent as to cause any erosion of the banks. The river being a black-water stream, carrying no silt, it is thought that the channel once dredged would require no maintenance by redredging for a number of years.

The amount of commerce on the Waccamaw River for the calendar year 1902, as reported and printed, was 141,686 tons, valued at $1,844,019, belonging to the Waccamaw River proper, without anything from its neighboring river, the Great Pedee, whose entire commerce is carried over the lower part of the Waccamaw.

This commerce in detail can be seen on page 1118, and list of vessels engaged in the traffic on page 1119, of the Annual Report of the Chief of Engineers for 1903.

Bench marks securing the mean low-water plane and stations securing the transit line were permanently established along the river.

It is estimated that in addition to the foregoing about $7,200 will be required yearly for snagging operations above Conway.

Much credit is due Mr. William H. Johnstone, surveyor, for valuable assistance rendered in efficiently completing the field work.

Very respectfully, your obedient servant,

REID WHITFORD,
Assistant Engineer.

Capt. G. P. HOWELL,
Corps of Engineers, U. S. A.

O

Sheet No 1.

WACCAMAW RIVER, S.C.

From Conway to Bull Creek.

Under the direction of

Capt. G.P. Howell, Corps of Engrs. U.S.A.

REID WHITFORD, U.S. ASST. ENGR.

William H. Johnstone.
SURVEYOR.

Scale: 1 in. = 1000 feet

November 1903.

(In 5 sheets.)

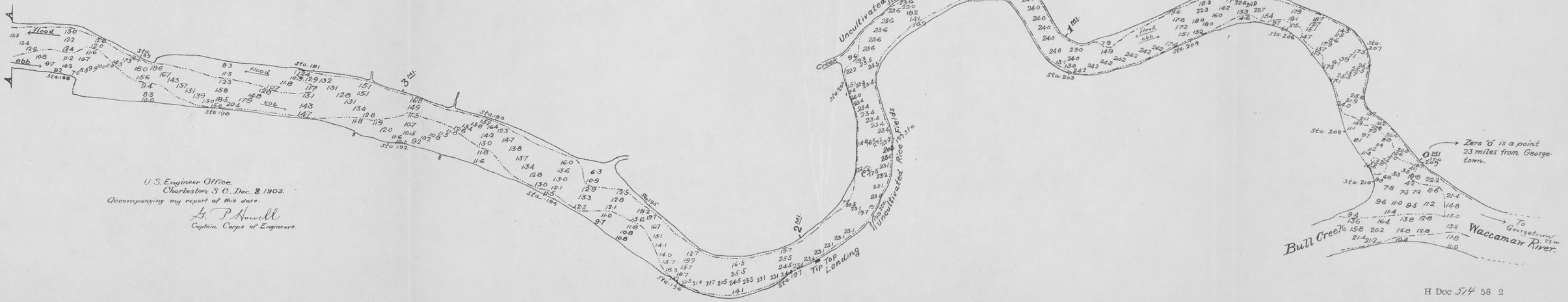
Notes: Soundings in feet and tenths and reduced to Mean Low Water, which was determined by averaging all the Low Water readings on the Standard Gauge at Conway, S.C. for the past eleven years beginning in 1893. The Zeros of the gauges at and below Conway are 0.7 ft below this adopted "Mean Low Water Level."

Explanations:

The object of this Survey was to form Estimates for 6 ft, 9 ft and 12 ft Channel depths at Mean Low Water from Conway to the Mouth of the River.
Proposed width of Channel, 100 feet.

Note: Channel depth from Bull Creek to mouth of River at Georgetown, 12 ft and over at mean low water, requiring no Survey.

..... Represents 12 ft Contour.



U.S. Engineer Office,
Charleston, S.C., Dec. 8, 1903.
Accompanying my report of this date.

G. P. Howell
Captain, Corps of Engineers.

Sheet N°2.

WACCAMAW RIVER, S.C.

From Conway to Bull Creek.

Under the direction of

Capt. G.P. Howell, Corps of Engrs, U.S.A.

Reid Whitford, U.S Asst. Engr.

William H. Johnstone, Surveyor.

Scale: 1 in. = 1000 feet

November 1903.

(In 5 sheets)

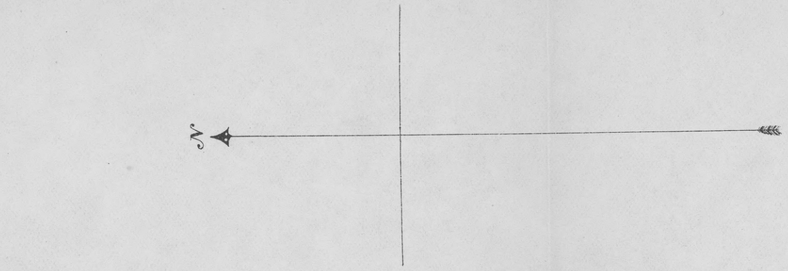
Notes: Soundings in feet and tenths and reduced to Mean Low Water, which was determined by averaging all the Low Water readings on the Standard Gauge at Conway, S.C. for the past eleven years beginning in 1899. The Zeros of the gauges at and below Conway are 0.7 ft below this adopted Mean Low Water Level.

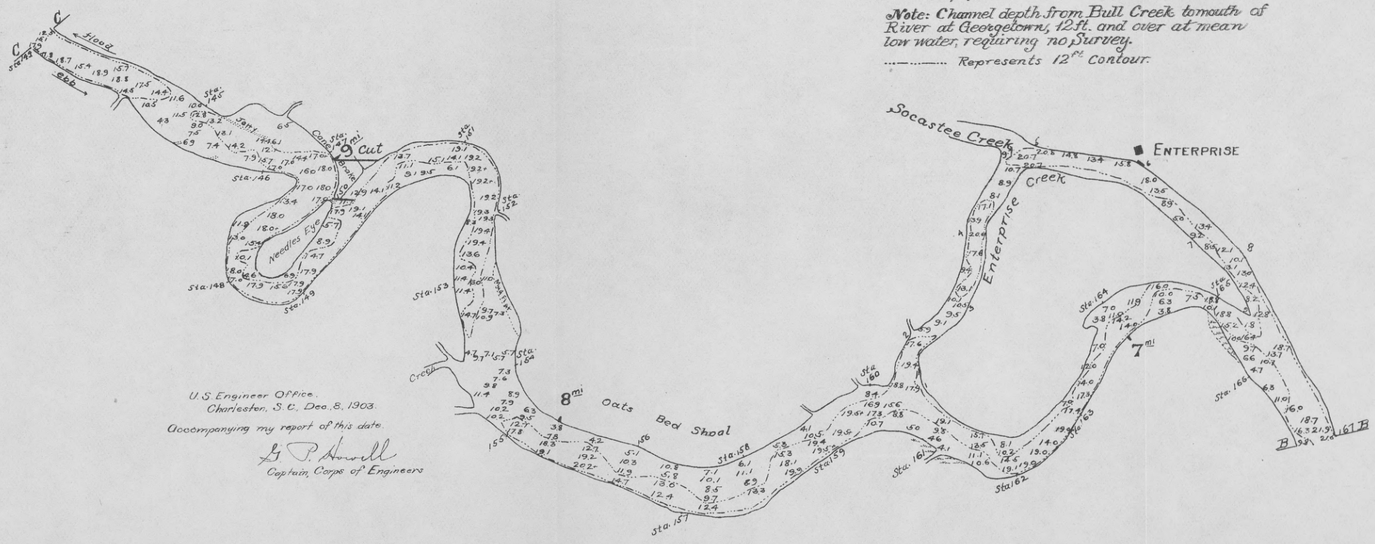
Explanations:

The object of this Survey was to form Estimates for 6 ft 9 ft and 12 ft Channel depths at Mean Low Water from Conway to the Mouth of the River.
Proposed width of Channel, 100 feet.

Note: Channel depth from Bull Creek to mouth of River at Georgetown, 12 ft. and over at mean low water, requiring no Survey.

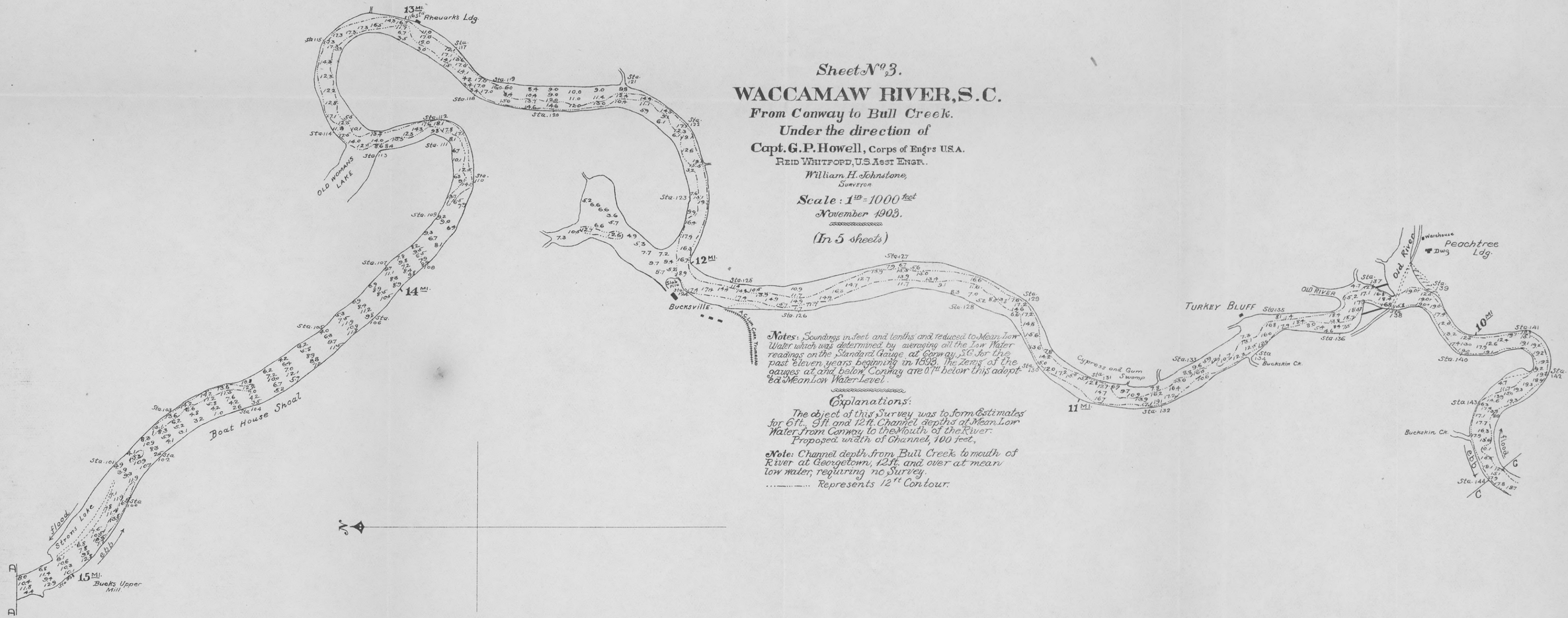
..... Represents 12 ft Contour.





U.S. Engineer Office.
Charleston, S.C. Dec. 8, 1903.
Accompanying my report of this date.

G. P. Howell
Captain, Corps of Engineers



Sheet No 3.

WACCAMAW RIVER, S.C.

From Conway to Bull Creek.

Under the direction of

Capt. G.P. Howell, Corps of Engrs U.S.A.

REID WHITFORD, U.S. ASST ENGR.

William H. Johnstone, Surveyor.

Scale: 1 in = 1000 feet

November 1903.

(In 5 sheets)

Notes: Soundings in feet and tenths and reduced to Mean Low Water which was determined by averaging all the low water readings on the Standard Gauge at Conway, S.C. for the past eleven years beginning in 1898. The zeros of the gauges at and below Conway are 0.7 ft below this adopted Mean Low Water Level.

Explanations:

The object of this Survey was to form Estimates for 6 ft., 9 ft and 12 ft. Channel depths at Mean Low Water from Conway to the Mouth of the River. Proposed width of Channel, 100 feet.

Note: Channel depth from Bull Creek to mouth of River at Georgetown, 12 ft. and over at mean low water, requiring no Survey.

..... Represents 12 ft Contour.

U.S. Engineer Office,
Charleston, S.C, Dec. 8, 1903.
Accompanying my report of this date.

G. P. Howell
Captain, Corps of Engineers.

Sheet N°4.

WACCAMAW RIVER, S.C.

From Conway to Bull Creek.

Under the direction of

Capt. G. P. Howell, Corps of Engrs. U.S.A.

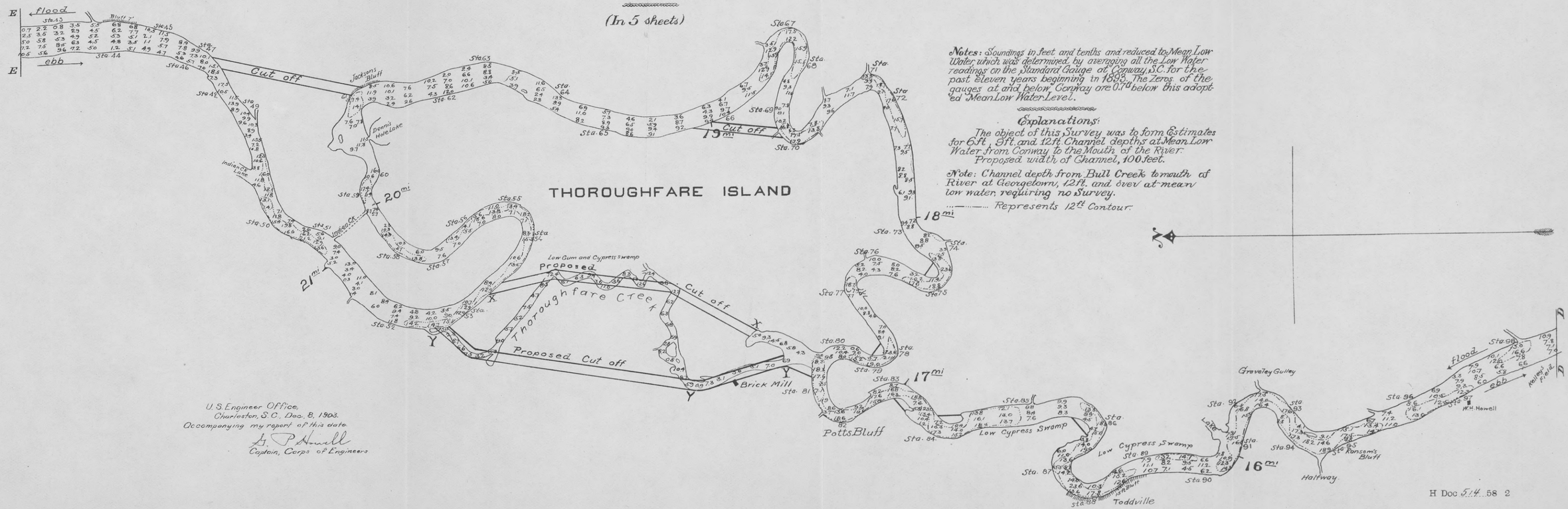
Reid Whitford, U.S. Asst. Engr.

William H. Johnstone. Surveyor.

Scale: 1 in. = 1000 feet

November 1903.

(In 5 sheets)



Notes: Soundings in feet and tenths and reduced to Mean Low Water which was determined by averaging all the Low Water readings on the Standard Gauge at Conway, S.C. for the past Eleven years beginning in 1892. The Zeros of the gauges at and below Conway are 0.1 ft below this adopted Mean Low Water Level.

Explanations:

The object of this Survey was to form Estimates for 6 ft, 9 ft. and 12 ft. Channel depths at Mean Low Water from Conway to the Mouth of the River.

Proposed width of Channel, 100 feet.

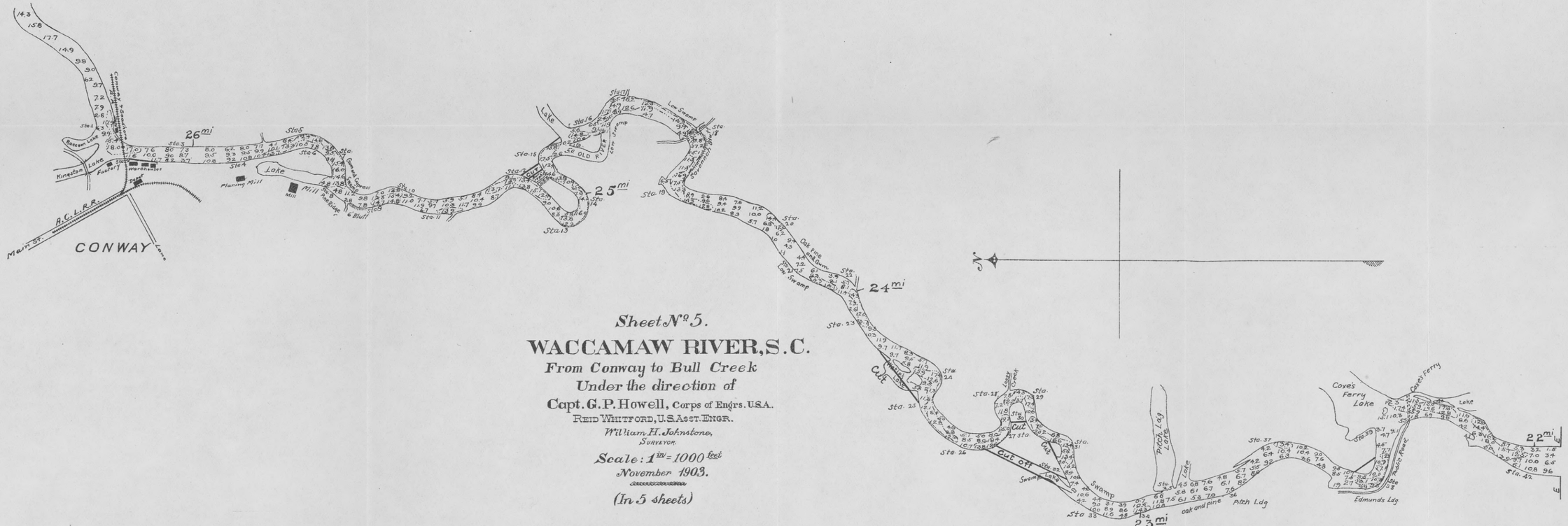
Note: Channel depth from Bull Creek to mouth of River at Georgetown, 12 ft. and over at mean low water, requiring no Survey.

...——... Represents 12 ft Contour.

U.S. Engineer Office,
Charleston, S.C., Dec. 8, 1903.
Accompanying my report of this date.

G. P. Howell
Captain, Corps of Engineers

H Doc 514 58 2



Sheet No. 5.

WACCAMAW RIVER, S.C.

From Conway to Bull Creek

Under the direction of

Capt. G. P. Howell, Corps of Engrs. U.S.A.

Reid Whitford, U.S. Asst. Engr.

William H. Johnstone, Surveyor.

Scale: 1 in. = 1000 feet

November 1903.

(In 5 sheets)

Notes: Soundings in feet and tenths and reduced to Mean Low Water, which was determined by averaging all the Low Water readings on the Standard Gauge at Conway, S.C. for the past eleven years beginning in 1892. The Zeros of the gauges at and below Conway are 0.7 ft. below this adopted Mean Low Water Level.

Explanations:

The object of this Survey was to form Estimates for 6 ft., 9 ft. and 12 ft. Channel depths at Mean Low Water from Conway to the Mouth of the River.

Proposed width of Channel, 100 feet.

Note: Channel depth from Bull Creek to mouth of River at Georgetown, 12 ft. and over at mean low water, requiring no Survey.

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U.S. Engineer Office,
Charleston, S.C., Dec. 8, 1903.
Accompanying my report of this date.

G. P. Howell
Captain, Corps of Engineers.

H Doc. 514 58 2